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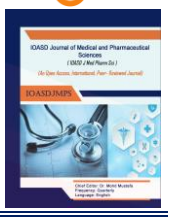

Medication Adherence Among Hypertensive Patients at Khartoum State – Sudan (2021-2024)

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ABSTRACT

Introduction: Hypertension nowadays is a major community health problem. It is high prevalence, which becomes an important area of research, which is also a major possibility for circulatory diseases and other complications. The study aims to Adherence Medication among Hypertensive patients at Khartoum State – Sudan (2021-2024). ***Methodology:*** hospital-based longitudinal surveillance study carried out among 203 patients with hypertension, who admitted/attended to Khartoum Governmental hospitals during the period from 2022 year. Data collected through direct interviewed questionnaire, Analysis was done by using SPSS 26.0 version software, descriptive statistics with the use of frequency and %, inferential statistics with Chi-square test, and *P* value ≤ 0.05 considered as significant. ***Results:*** Majority of them 79(38.9%) within age group >50 years, 131(64.5%) were male, 141(69.5%) were married. The duration of hypertension was 1 – 5 years in majority. Controlled blood pressure was reported in 59(29.1%). The overall patients knowledge regarding hypertension disease in majority 81(39.9%) was poor, followed by 63(31%) was fair, and 59(29%) was good. Patients adherent to medication was 92(45.3%), non-adherence was commonly due to forgot to take medication 33(29.7%). Regarding follow up, 89(43.8%) had regular follow up. Even though patients categorized as second and third stage of hypertension have high frequency of medication non-adherence but not attain the significant level (P value=0.059). Most of patients with good diet were had normal blood pressure or first stage hypertension. (p value=0.021). ***Conclusion:*** Patients with good dietary adherence is significantly associated with better blood pressure control, and good knowledge about hypertension, this emphasizing the importance of educational interventions and indicating that dietary management is crucial for hypertension control

Keywords: hypertension, diet, physical activity, adherence, blood pressure, knowledge, anti-hypertension medications.

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INTRODUCTION

Hypertension, also known as high blood pressure, is a condition in which the blood vessels have persistently raised pressure. The vessels transport blood from the heart to every region of the body. The heart pumps blood into the vessels with each beat. Blood pressure is the result of the force of the heart pumping blood against the walls of blood arteries [1]. Coronary heart disease, congestive heart failure, stroke, and renal illness are all significantly influenced by hypertension [2, 3]. The prevalence of hypertension increases with age, and in many developed nations, it affects over 50% of people over the age of 55 [4]. The estimated prevalence of HTN in poor and middle-income countries (LMICs) is 31.1%, which is comparatively high when compared to the high-income nations' 28.5% prevalence [5].

Socioeconomic status has an impact on HTN control in LMICs. Africa has been reported to have the highest prevalence of HTN worldwide. The most frequent consequence of hypertension is cardiovascular disease, which accounts for around 80% of deaths in LMICs [6,7]. Due to growing urbanization and behavioral changes linked to risk factors, the prevalence of HTN is increasing in Sudan. One in four individuals with a non-communicable disease has hypertension, making it the second most common type in North Africa [8]. It is also one of the main risk factors for death and

disability from cardiovascular disease. Every year, 7.5 million people die from hypertension, which affects about one billion people globally.

In 2016, ischemic heart disease and cerebrovascular disease were responsible for almost half of all deaths worldwide and disability-adjusted life years [9]. Eating a nutritious diet is a key strategy for lowering blood pressure (BP). The Dietary Approaches to Stop Hypertension (DASH) experiment provided conclusive evidence of this, showing that a diet low in saturated fat and cholesterol and high in fruits, vegetables, and low-fat dairy products decreased blood pressure (BP) [10].

Management of high blood pressure the goal of treating hypertension is to lower mortality by regulating elevated blood pressure and to prevent CVD brought on by elevated blood pressure. In order to reduce mortality and enhance quality of life, treatment for patients with established CVD focuses on controlling blood pressure in order to stop the condition from progressing or reoccurring. Patients with a higher risk of CVD benefit more from HTN treatment. According to the majority of clinical trials on hypertension, lowering SBP by around 10–20 mmHg or DBP by roughly 5–10 mmHg can lower the risk of stroke by 30–40% and ischemic heart disease by 15–20% [11,12]. The purpose of this study was to evaluate the medication and diet adherence of hypertensive patients in Khartoum State, Sudan.

METHODS

Study setting and design

The study was carried out at Khartoum state, Khartoum State is one of the eighteen states of Sudan. Although it is the smallest state by area (22,142 km^2), it is the most populous (5,274,321 in 2008 census). It contains the country's second largest city by population, Omdurman, and the city of Khartoum, which is the capital of the state as well as the national capital of Sudan. The capital city contains offices of the state, governmental and non-governmental organizations, cultural institutions, and the main airport. Khartoum Governmental hospitals included were Omdurman teaching hospital, Ombada hospital, Hag elsafi teaching hospital, Bhri hospital, Ibrahim malik teaching hospital, and Bashaeir teaching hospital.

Population and eligibility

The source population for this study consisted of Patients with hypertension, who admitted to hospital and/ or came to outpatient clinic to checkup during the time of the study 2022. Patients diagnosed as hypertension on antihypertensive medications for at least six months with or without other co-existing medical conditions, who agreed to participate, were included, and Patients who did not agree to participate and patient drawback after study were excluded. In this study, 203 patients were included.

Methods of data collection

Data was collected by two materials, an interview using structural questionnaires designed by the researcher as a tool. And tool of assessment calculation of BMI using the formula:

Weight (lb) / [height (in)] ^{2}

Data collected in two phases:

Phase one the initial data collection, phase two measure the height and weight to calculate BMI, assessment of knowledge regarding hypertension, and treatment adherence.

Validity and reliability of Tools:

The tools examined by expertise in flied of the study and analyzed to obtain alpha Cronbach result.

Study variables

The primary focus of this research was to examine the level of adherence to antihypertension medications.

Statistical analysis

Data collected for the study were inputted into an electronic database and subsequently exported to SPSS version 26 for further analysis. The study findings were then presented and elucidated through the use of text, tables, and figures. To provide a comprehensive overview, various descriptive statistics such as proportions, frequency distributions, means, and standard deviations were employed. In order to address missing data, an analysis was conducted using to exclude cases with missing data and focus on the available data. To examine the relation- ship between the dependent and independent variables, a binary logistic regression was conducted.

RESULTS

Two hundred and three hypertensive patients were included in this study, majority of them 79(38.9%) within age group >50 years, followed by 56(27.6%) within age group 41 -50 years, 45(22.2%) within age group 31 – 40 years, and 23(11.3%) within age group 20 – 30 years. Males showed predominance among participants were 131(64.5%), while female were 72(35.5%). The majority of patients were married 141(69.5%), while divorced/ widowed were 40(19.7%), and unmarried was 22(10.8%). The education level of majority, 61(30%) was primary school level, followed by 58(28.6%) was secondary school level, and 44(21.7%) were illiterate or having traditional education (Khalwa). Not working was 63(31%), followed by self-employment was 60(29.6%), work in governmental sector was 31(15.2%), work in private sector was 35(17.2%), and retired was 14(6.9 %). Over half of patients did not have Health insurance 107(52.7%), while 96(47.3%) have health insurance. (Table-1)

Table 1 : Socio-demographic characteristics of hypertensive patients			
Variables	**Categories**	**Frequency(*n*)**	**Percent (%)**
Sex	Female	72	35.5
	Male	131	64.5
Age	20 - 30 years	23	11.3
	31 - 40 years	45	22.2
	41 – 50	56	27.6
	>50years	79	38.9
Marital Status	Unmarried	22	10.8
	Married	141	69.5
	Divorced/Widowed	40	19.7
Level of Education	illiterate	44	21.7
	Primary school	61	30.0
	Secondary	58	28.6
	University and above	165	19.7
Work Status	Self employed	60	29.6
	Work in private sector	35	17.2
	Government employed	31	15.2
	Not working	63	31.0
	Retired	14	6.9
Residence	Inside Khartoum state	100	49.3
	Outside Khartoum state	103	50.7
Have health insurance	Yes	96	47.3
	No	107	52.7

Health profile

The duration of hypertension was varied between zero – 5 years was 92(45.3%), 6 – 10 years in 68(33.5%), 11 – 15 years in 21(10.4%), and more than 15 years in 22(10.8%). The overall knowledge regarding high blood pressure in majority 81(39.9%) was poor, followed by 63(31%) was fair, and 59(29%) was good. Regarding comorbidities, 93(45.8%) of patients had diabetes mellitus, 25(12.3%) had renal disease, 13(6.4%) had thyroid disease, 13(6.4%) had heart failure, and 12(5.9%) had ischemic heart disease. Regarding follow up, 89(43.8%) had regular follow up, 91(44.8%) when symptoms appear, and 7(3.5%) had daily follow up. While 16(7.9%) never follow up. The majority 62(30.5%) of patients attend health care for follow up, 42(20.7%) in private centers and hospitals. The majority 113(55.7%) of patients had normal body mass index, followed by 60(29.5%) were overweight, 19(9.4%) were obese, and 10(4.9%) were underweight**.** Controlled blood pressure was reported in 59(29.1%). **(Table-2)**

Table 2 Health profile characteristics of hypertensive patients			
Variables	Categories	Frequency (n)	Percent (%)
Duration of hypertension	0 - 5	92	45.3
	6 - 10	68	33.5
	11 - 15	21	10.4
	> 15	22	10.8
Knowledge of HTN	Good Knowledge	59	29.1
	Fair knowledge	63	31.0
	Poor Knowledge	81	39.9
Comorbidity	Yes	189	93.4
	No	14	6.9
Type of Comorbidity	DM	93	45.8
	CVD	31	15.2
	Renal diseases	25	12.3
	Thyroid disease	13	6.4
Follow up	Daily	7	3.5
	Regularly	89	43.8
	When symptoms appear	91	44.8
	Never	16	7.9
Body Mass Index (Kg/M2)	Underweight	10	4.9
	Normal	113	55.7
	Over Weight	60	29.5

	Obesity	20	9.9
Blood Pressure Status	Controlled	59	29.1
	Uncontrolled	144	70.9

Awareness of treatment adherence

The majority of patients 88(43.3%) changed their medication about year ago, followed by 55(27.1%) change it 6 months ago. The reason of medication change in 91(44.8%) was due to feeling of deteriorating health, followed by 62(30.5%) due to the unavailability and rarity of the medication, 33(16.2%) due to the increase in the price of the medication, and 17(8.5%) due to fear of side effects of the medication. The change in medication was increase the dose in 81(39.9%), decrease the dose in 38(18.7%), and did not change the dose in 84(41.4%). The majority of patients experienced a sudden increase or decrease in blood pressure related to dose 68(33.5%) one time, 30(14.8%) two times, and 11(5.4%) three times and more. **(Table-3).**

Table 3: Awareness regarding treatment adherence among hypertension disease among hypertensive patients

		N	%
How long ago patients change medication	Month	19	9.4
	6 months	55	27.1
	Year	88	43.3
	More than year	41	20.2
Reasons of changing medication	Due to my feeling of deteriorating health	91	44.8
	Due to the unavailability and rarity of the medication	62	30.5
	Due to the increase in the price of the medication	33	16.2
	Fear of side effects of the medication	17	8.5
The change in dose	Increased the dosage	81	39.9
	decreased the dosage	38	18.7
	did not change the dosage	84	41.4
Experienced a sudden increase or decrease in blood pressure related to dose	No	94	46.3
	Once	68	33.5
	Twice	30	14.8
	Three or more times	11	5.4

Medication adherence

Patient's adherence to medication rate was 92(45.3%). As it showed in **(Figure -1)**. Non-adherence was due to forgot to take medication 33(29.7%), after feeling better 29(26.1%), took two doses when forgetting a dose 21(18.9%), preference for alternative medicine 13(11.7%), neglected to take medication 9 (8.2%), and fear of addiction in 6(5.4%). The majority of patients 109(53.7%) recognize their treatment by it is color, and 94(46.3%) by it is name. detailed in **(Figure-2)**

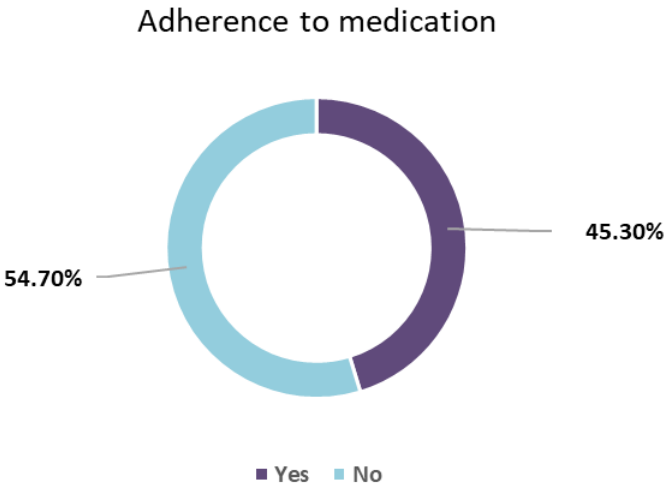

Figure 1: Antihypertension medications adherence, among hypertensive patients.

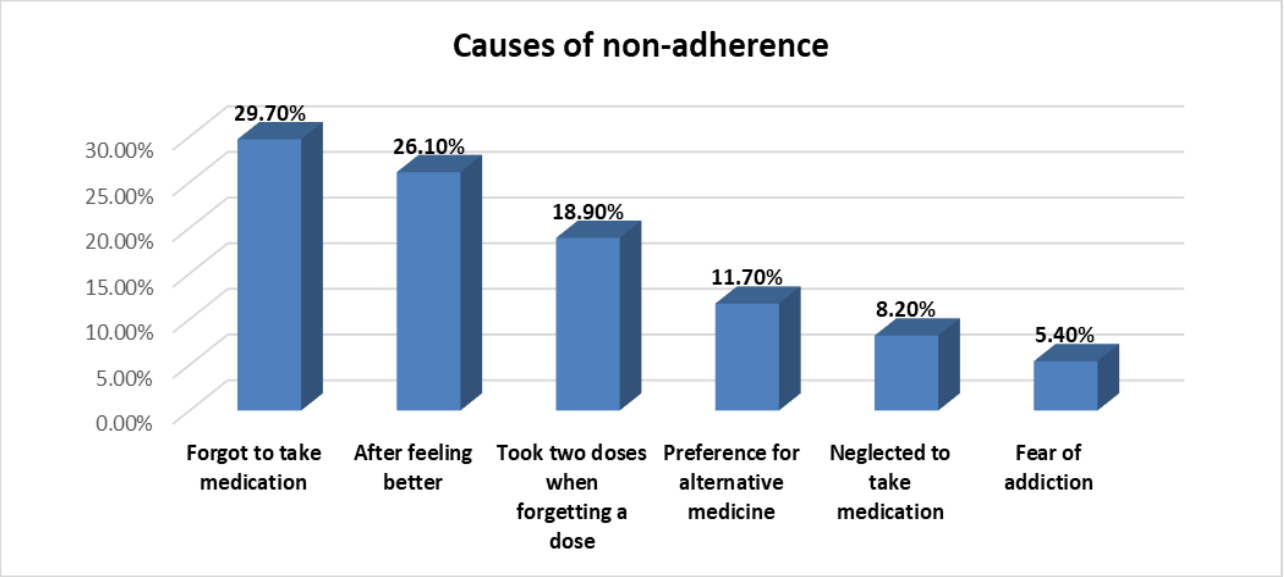

Figure 2: Antihypertension medications adherence, and causes of non-adherence among hypertensive patients

Antihypertension adherence and sociodemographic information's association

Anti-hypertension medication adherence was not associated with patients age group (P value= 0.573), patients gender (P value= 0.631), Marital status (P value= 0.153), and education level (P value= 0.099). Medication adherence was not associated with having health insurance among hypertensive patients (P value =0.120). Even though patients categorized as second stage and third stage of hypertension have high frequency of medication non-adherence but not attain the significant level. (P value=0.059). Having good knowledge regarding hypertension was significantly associated with adherence to anti-hypertension medications (p value =0.00). **(Table-4)**

Table 4: Sociodemographic and Antihypertension medication adherence associations

Sociodemographic information		Medication adherence		Total	P value
		Adherent	Non adherent		
Age	20 - 30	11(5.4%)	12(5.9%)	23(11.3%)	0.573
	31 - 40	21(10.3%)	24(11.8%)	45(22.2%)	
	40 - 50	21(10.3%)	35(17.2%)	56(27.6%)	
	>50	39(19.2%)	40(19.7%)	79(38.9%)	
Sex	Male	61(30.0%)	70(34.5%)	131(64.5%)	**0.631**
	Female	31(15.3%)	41(20.2%)	72(35.5%)	
Marital Status	Married	65(32.0%)	76(37.4%)	141(69.5%)	0.135
	Unmarried	6(3.0%)	16(7.9%)	22(10.8%)	
	Divorced \ widowed	21(10.3%)	19(9.4%)	40(19.7%)	
Education	Nill \ traditional	22(10.8%)	22(10.8%)	44(21.7%)	0.099
	Primary	34(16.7%)	27(13.3%)	61(30.0%)	
	Secondary	20(9.9%)	38(18.7%)	58(28.6%)	
	University & above	16(7.9%)	24(11.8%)	40(19.7%)	
Health insurance	Yes	38(18.7%)	58(28.6%)	96(47.3%)	0.120
	No	24(26.6%)	53(26.1%)	107(52.7%)	
Blood pressure	Controlled (normal)	33(16.3%)	26(12.8%)	59(29.1%)	0.059
	First stage	58(28.6%)	77(37.9%)	135(66.5%)	
	Second stage	1(0.5%)	5(2.5%)	6(3.0%)	
	Third	0(0.0%)	3(1.5%)	3(1.5%)	
Knowledge	Poor	21(10.3%)	60(29.6%)	81(39.9%)	0.000
	Fair	31(15.3%)	32(15.8%)	63(31.0%)	
	Good	40(19.7%)	19(9.4%)	59(29.1%)	
Total		92(45.3%)	111(54.7%)	**203(100.0%)**	

DISCUSSION

This study identified some major themes relating to hypertensive adults' lack of knowledge of normal blood pressure values, duration, Risk factors, medications adherence, and ways to control hypertension, alternative beliefs for HPT control. Few studies have reported on hypertensive adults' knowledge of normal blood pressure values; however, some studies have investigated knowledge about hypertension as a health condition [13,14,15]. In this study we observed that 88(43.3%) know the meaning of hypertension, the overall knowledge in majority 81(39.9%) was poor, followed by 63(31%) was fair, and 59(29%) was good. In line *Sekome K, et al;* [16] study found that hypertensive adults have little to no knowledge about high blood pressure normal values. *Wolde M, et al;* [17] study observed that the majority (55.3%) of the patients had a low level of knowledge, 17.9% had a moderate level of knowledge whereas 26.8% had a high level of knowledge about hypertension. While higher frequency of good knowledge reported by *Worku Kassahun C, et al;* [18] that 215 (56%) had good knowledge towards hypertension. This variation could be due to differences in educational interventions, healthcare access, and demographic factors.

Adherence to the antihypertensive medication can result in the controlled blood pressure. In addition, reduction in adverse effects. However, it has found that despite clear and consistent communication from the clinician about the benefits of antihypertensive therapy, it is difficult to make the patients adhere to the medication. As hypertension needs long term adherence to treatment, this study was carried out to evaluate the adherence of the anti-hypertensive drugs. Observed patient's adherence (medium to high adherence) to Antihypertension medication rate was 92(45.3%). This in line with Khadka S, et al; [19] study findings that medication as per the Morisky adherence scale, 38.8% had medium level of adherence, 37.4% had a low adherence level, and 23.9% had a high adherence level among 348 participants. Whereas, in the study conducted by Hashmi et al [20) in Pakistan among 438 patients, 77% of cases were adherent and 23% of cases were non-adherent to the antihypertensive therapy. Additionally, Sharma S, et al; [21] study revealed that 61% of patients with hypertension had moderate to high levels of adherence to antihypertensive medications.

This study revealed that medication non-adherence was commonly due to forgot to take medication 29.7%, followed by after feeling better 26.1%, took two doses when forgetting a dose 18.9%, and preference for alternative medicine 11.7%. This consistent with Sharma S, et al; [21] study findings, which reported that forgetfulness, the presence of side effects, and not taking medication timely are the common reasons for low adherence. Forgetfulness was the top reported cause (72%) of unintended non-adherence, similar to our findings. It is also consistent with the Khadka S, et al; (19) study findings from a hospital-based study done in five centers in Nepal that reported 56% of the participants were non-adherent to antihypertensive therapy due to forgetfulness. These demand strategies to address forgetfulness, such as text or voice messages, and personalized reminders that can remind patients to improve their adherence to medications [22,23].

Moreover, this study reported patient's age group, patient's gender, marital status, and education level, or being having health insurance did not influence that anti-hypertension medication adherence. Similar finding observed by Khadka S, et al; [19] that Different socio-economic factors such as educational level, age, sex, employment status were considered that could affect the adherence to the medication. On other hand Okello et al [24] in Uganda, drug adhesion was relatively high in uneducated (55.9%) than patient who are educated above tertiary level (6.3%.). our study not reported this association but we found that patients have good knowledge regarding hypertension were significantly had higher adherence to anti-hypertension medications (p value =0.00).

In regard of gender systemic review and meta-analysis of the adherence to antihypertensive drugs in 2017 done by Abegaz et al [25] the percentage of non-adherence to antihypertensive medications was higher in females: 53.9% than males: 46.2%. whereas in this study male and female had nearly equal percentages in non-adherence to medications (53.4%, and 56.9% respectively). While considering the marital status of patient, in this study we found no differences between people with strong family support (married) and those unmarried, divorced/widowed in medication adherence. Khadka S, et al; [19] found that married patient have high adherence to the drug, but not attained the significance level. These findings highlight the complexity of medication adherence and suggest that multiple factors, including socio-economic and demographic variables, can influence patient behavior in different ways.

CONCLUSION

Male patients make up the bulk, and most are over fifty. The majority of participants were married and only completed elementary or secondary school. Most people with hypertension had it for 0–5 years. The rate of drug adherence among patients was 45.3%. 29.1% of people reported having controlled blood pressure. More than one-third of patients knew very little. Age group, gender, marital status, education level, and health insurance status did not correlate with adherence to antihypertensive medication. On the other hand, adherence to anti-hypertensive drugs was substantially correlated with having solid understanding about hypertension.

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Conflict of interest

Authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest, non-financial interest in the subject matter or materials discussed in this manuscript.

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